

# Electric switch and/or display element for automobile steering wheel enclosed by elastic cap with outer surface matched to surface contour of steering wheel

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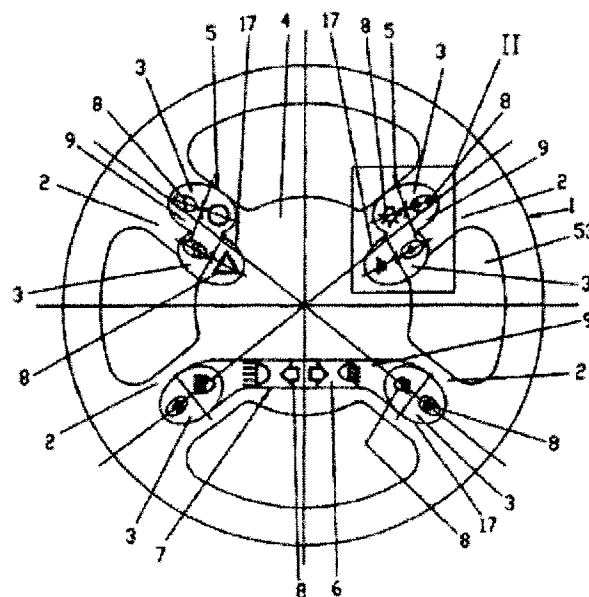
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## Abstract of **DE19853819**

The switch (3) and/or display element (6) incorporated in the automobile steering wheel (1) has a surface which is covered by an elastic cap (9), provided with an outer surface which is matched to the surface structure of the steering wheel, the interface between the surface of the steering wheel and the surface of the elastic cap covered by an intermediate lip.



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The invention refers to a switch and/or a display element, that and/or. into a steering wheel of a motor vehicle is built.

There is well-known into the steering wheel of a motor vehicle inserted switches, whose housing-laterally stored actuators for the operator are freely accessible and visibly arranged. In order to ensure the adjustable of the actuator, this must be stored with sufficient play in the casing. Due to the play a visible gap between the casing and the actuator, by the debris and humidity is present into the switch to penetrate can, whereby the switch in its function and in its outside appearance is impaired. Dirt deposits arise in particular at the edges of rested switches, since the actuator in the rested position does not exhibit the same level as in the ungerasteten position. A reduction of the visible gap by a restricting of the manufacturing tolerances increases the manufacture and assembly costs. Furthermore the integration of these switches proves into the steering wheel as optical disturbing.

Further push button switches are well-known, which are provided with a protective cap covering the push button. These push button switches are built frequently into agricultural vehicles, construction machines and manufacturing machines. The flexible protective cap exhibits a broad circulating edge, which is touched over the switch housing and determined there with a screw connection. Thereby on the one hand the tightness of the switch and on the other hand the seat of the switch are ensured. This arrangement is not to that extent unfavorably as with too solid turning of the screw connection the protective cap between the sealing surfaces is out-squeezed and with too easy turning of the screw connection a sufficiently solid switch seat is present. Functionally the protective cap is very durably implemented, whereby the switching feeling is impaired during operation of the push button switch. Due to the robustness of the protective cap it works optically roughly and is not suitable for the cover of display elements.

With combinations of switches and display elements always a gap is or at least a seam visible between the individual elements, which shows the individual elements and to the contamination bends.

It is task of the invention to create a switch and/or a display element of the kind initially specified that and/or. the overall view with small inclination to the contamination with simultaneous low manufacturing costs, uniform in the installation situation, ensures.

According to invention the task is solved by the fact that the free surface of the switch and/or the display element is covered with a flexible flap.

This measure makes the installation possible of the switch and/or the display element into the steering wheel and/or. its percussion pot without a recognizable gap between an actuator of the switch and its casings or Trennähten of the display element, whereby a uniform overall view with a unzerklüfteten surface is given. Simultaneous one is protected the inside of the switch and/or the display element against contamination, whereby the flexible flap causes only a small increase of manufacturing costs of the switch and/or the display element. Furthermore the flexible structure of the flap ensures a safe resetting of the switch by the switching mechanics of the switch used underneath the actuator.

▲ top After a favourable arrangement of the invention the free cap surface of the flap is adapted to the surface structure of the steering wheel and exhibits at its edges a continuous transition to the steering wheel. Preferentially the edges of the free cap surface are provided with a transient area between the switch and/or the display element as well as the steering wheel covering, circulating transition lip. Thereby the general impression of a compact unit results. The transition lip locks the small gap between the surface of the cover as well as the surrounding range of the steering wheel and/or. the percussion pot, on the one hand an accumulation of dirt in this gap and amplified prevents on the other hand the impression of the uniform surface.

Hinterschnitte are attached appropriately for the definition of the flap at a casing, in which corresponding Hintergriffe of the flap intervenes. Sonach are needed for the adjustment of the flap no additional fastening elements.

In order to obtain as compact a structure of the switch and/or the display element as possible, which are to be realized simultaneous form-technically relatively simply, the Hinterschnitte is let in into side walls of the casing and the flap is provided with a flexible edge setting on the side walls, to which the Hintergriffe is angeformt.

After a favourable further training of the invention thought, the side walls of the casing are tapered in the coverage with the edge of the flap around the thickness of the edge. This measure guarantees the correct seat of the flap with a umschlossenen fitting space of the switch and/or the display element, since the Hintergriffe of the flap cannot separate from the Hinterschnitten of the casing.

When subjecting the actuator of the switch the flap is not to be damaged. Therefore the casing is appropriately at least provided with upper edges exhibiting at the insides radii. The radii make a sliding for the flap possible and prevent their overstressing.

Around the throw directly too transferred no cavity may be present between the flap and the actuator of the switch.

Therefore at least the inside of the flexible flap is in the range of an actuator of the switch its outline copied after a further training of the invention. The adapted outlines of the flap and the actuator avoid free travel of the flap with the admission of the actuator, from which at the beginning of a spongelike switching feeling would result, until the flap would come to the plant at the actuator.

In order to arrange a switching low-friction, the flap on its lower surface is provided with the actuator of the switch circulating depression. This depression makes a low-friction switching possible, since the deformation resistance is smaller in this range than in the other ranges of the flap. In the further the necessary return force of the switching mechanics and thus the wear of the switch are smaller.

So that several switching functions made available can, is appropriately casings switch into at least two with actuators provided switching zones divided, which are separate by bar radii exhibiting zone bars, against which the flap rests. By the zone bars switching of a switching function is surely feasible, without a neighbouring switching function is along-switched unconsciously. Further the zone bars prevent a breaking in of the flap into the range between the switching zones. The bar radii existing at the zone bars facilitate a switching and prevent a damage of the flexible flap due to sharp edges.

In order to arrange furthermore the form of the switch still safer, it is preferentially intended that the outline of the actuators exhibits a tangential transition to the top side of the zone bar. Sonach is maintained the flap with relatively large variations in temperature the desired form.

Preferentially the flap is made of a transparent material and the actuator as light guide, which with a source of light of the switch cooperates, trained. A search lighting or a function lighting arranged behind the flap is recognizable sonach. The moreover an even is possible, on the switching zone to limited light distribution by the arrangement of the actuator than light guides.

The flap within the range appropriately covers and/or. the actuators of the switch and/or the display element optically and/or tactile detectable symbols. Sonach is ensured the allocation of different functions.

During a favourable arrangement of the invention the symbol and the flap consist of at least two different materials. For example the flap from a transparent material is manufactured, which is painted in a first processing step in a color of the symbol and in a second processing step the color of the final surface of the flap receives. In order to open the color of the symbol, the color of the surface with a laser is removed in such a manner that the symbol is illustrated outline-exactly. Thus the use of the different materials permits an optical distinction of flap and symbol.

Preferred the actuator of the switch subjects a housing-solid micro switch. The actuator is limited appropriately by at least an abutment in its lift. The micro switch makes reliably working switching mechanics available, whose overloading is protected by the abutment due to an excess stroke of the actuator. The mechanical debris before an excess stroke of the actuator makes possible the use for a smaller and thus lower-priced variant of the Mikroschalters.

After a further training of the invention over the flap stretches at least two closed-up switches and/or display elements. In an alternative arrangement the flap spans at least two to each other beabstandete switches as well as at least a display element arranged between the switches. Thus several switches and/or display elements can be combined into a construction unit of almost arbitrary value, without Trennähte or gaps between the switches and/or the display elements are present.

The switch and/or the display element need a certain area and may not thereby not into the range of the Airbags in-rich. Therefore the switch and/or the display element are assigned in the external area of the percussion pot and in the ranges of the spokes. In order to use these ranges as completely as possible, the outer contour of the casing of the switch and/or the display element of the form of the percussion pot and/or the steering wheel spokes of the steering wheel is adapted.

It understands itself to leave that those are usable managing specified and features below still which can be described not only in the combination indicated in each case, but also in other combinations, without the framework of the present invention.

The invention is more near described in the following on the basis an embodiment with reference to the associated designs. Show:

Fig. 1 a display of a steering wheel of a motor vehicle with switches and display elements according to invention,

Fig. 2 an increased display of the item II after Fig. 1,

Fig. 3 a partial section by the display after Fig. 2 in accordance with line III-III,

Fig. 4 a partial section by the display after Fig. 2 in accordance with line IV-IV.

Fig. 5 a cut by the display after Fig. 2 in accordance with line V-V in the unactuated condition of the switch,

Fig. 6 a cut by the display after Fig. 2 in accordance with line VI-VI,

Fig. 7 a display after Fig. 5 in the actuated condition of the switch,

Fig. 8 a display after Fig. 2 toward the arrow VIII,

Fig. 9 an increased partial section by the display after Fig. 2 in accordance with line IX-IX and

Fig. 10 an increased display of the item X after Fig. 6.

The Fig. 1 shows an opinion to a steering wheel 1 of a motor vehicle, which is designed as four spoked steering wheel. Into the two upper spokes 2 switches 3 are assigned, which partly project into the percussion pot 4 of the steering wheel 1. The switches 3 of each spoke 2 are combined into a pair of switches 5. Into the lower spokes 2 in each case a switch 3 is assigned, between which a display element 6 is arranged. The display element 6 runs over the percussion pot 4,

however 4 Airbags inserted outside of the range into the percussion pot. The switches 3 and the display element 6 form a functional unit 7. Both the pairs of switches 5 and the functional unit 7 are exaggerated by a flexible flap 9 in each case.

The flap 9 carries 6 symbols 8 above the switch 3 and the display element, on a switched and/or. refer to one function which can be switched. The flexible flap 9 exhibits the same surface structure as the steering wheel 1, according to which an even appearance of the surface results. The free cap surface 10 fits itself however not only optically into the structure of the steering wheel 1 in, but exhibits also at their edges 11 a continuous transition to the steering wheel 1.

The structure of the switch 3 and the display element 6 is conventional and enclosure in each case a casing 12 with a socket 15. In order to fasten the flexible flap surely 9 to the switch 5 and/or to the display element 6, each casing 12 provided with Hinterschnitten 13 is, which are arranged circulating at the side walls 14 of the casing 12. From the free cap surface 10 a circulating edge 11 toward the side walls 14 of the casing 12, which carries 12 intervening Hintergriffe 16 into the Hinterschnitte 13 of the casing, extends. Since the flap is flexible 9 with their edges 11, these expand themselves when putting on on the casing 12, after complete postponing of the flap 9 and the Hintergriffe 16 into the Hinterschnitte 13 of the casing 12 and the flap 9 put to easing the edges 11 are fixed.

In the coverage with the flap 9 the side walls 14 of the housing 12 are tapered around the thickness of the edge 11 of the flap 9, whereby a process of the side walls 14 and the edges 11 on same level results, what the installation of the switch 3 into an appropriate opening 17 of the steering wheel 1 relieved.

With an alternative fixing the circulating edge 11 of the flap 9 extends over the entire height of the side walls 14 of the casing 12 and the Hintergriffe 16 of the edge 11 of the flap 9 at least bereichsweise between the side walls 14 of the casing 12 and a socket 15 is gotten jammed. Due to this attachment variant an installation dimension of the switch 3 results likewise and/or. Display element 6 on same level, according to which the installation is relieved into the appropriate opening 17 of the steering wheel 1.

The Fig. the opening 17 of the steering wheel 1 shows 9, into which the switch 3 under play is inserted. In order to cover this play, a transition lip 18 is moulded on 9 in the transient area of the switch 3 at the flexible flap to the steering wheel 1, which rests upon a roundness 19. The transition lip 18 covered to the play between the switch the 3 as well as the steering wheel 1 and on the other hand provides it for a continuous transition at the surfaces.

The Fig. a pair of switches 6 arranged from two switches 3 shows 2. The upper switch 3 is taken up complete of the spoke 2 and exhibits an elliptical outer contour. The lower switch 3 is partly within the spoke 2 and partly within the percussion pot 4. This switch 3 is provided with an elliptical cutout 20, which serves 3 for the partial admission of the upper switch. The cutout 20 makes a closer together-lies the two switches for 3 possible. The lower switch 3 rises up with its casing 12 bereichsweise into a free space 53 of the steering wheel 1 and is, as in Fig. 8 recognizably, for the cover of this free space 53 with a housing-lateral nose 21 provide, which is adapted to the outline of the percussion pot 4 and the spoke 2.

The pair of switches 5 covers the two elliptical switches 3 covering flap 9, which is manufactured from a transparent material, why the outlines of the switches 3 in Fig. 2 as visible edges is represented. For the avoidance of notch effects, radii 22 are angeformt at the ellipse transitions.

Everyone the switch 3 is divided in two, by a zone bar 24 separate switching zones 23. In the upper switch 3 the switching zones are 23 equally large, in the lower switch 3 are reduced one of the switching zones by the elliptical cutout 20. The height of the zone bar 24 is so limited that the flexible flap 9 with its inside on the zone bar 24 rests upon. The zone bars 24 end at the side walls 14 of the casing 12 with its upper edges 25. On the upper edges 25 of the casing 26 radii 27 are attached at the insides. Also the zone bars 24 exhibit bar radii 28 toward each switching zone 23, so that during operation of the flap 9 this does not come anywhere with a sharp edge into contact.

In each switching zone 24 of the switch 3 an actuator 29 is arranged, which go-aged with play between the insides 26 and the zone bar 24 lengthwise-relocatable. The control side 30 of the actuator 29 is, up to the grip recesses 32, to the outline of the steering wheel 1 and/or. the percussion pot 4 adapted, D. h. during a continuation of the surface of the control side 30 this would exhibit a tangential transition both to the top side 31 of the zone bars 24 and to the upper edges 25 of the casing 12. The complete switch 3 and/or. the pair of switches 5 and/or the functional unit 7 are carried back around the thickness of the flap 9 in the steering wheel 1 and/or. Percussion pot 4 arranged, according to which by putting the flap 9 on the switch 3 on and/or. the pair of switches 5 and/or the functional unit 7 a transition on the same level are present. The inside of the flexible flap 9 is adapted to the outline of the control side 30 of the spring-loaded actuator 29. To the extent extent of the actuator 29 a circulating depression 31 is let in into the inside of the flap 9. The indentation 31 is not visible and permits an easier subjecting of the actuator 29.

Into the flap 9 a grip recess 32 for the actuator 29 of the switch 3 is let in, made possible for ore branches of the actuator 29. Since this grip recess 32 is always only on a side of the switch 3, a perfect allocation of the switching function of the switch 3 is ensured. The actuator 29 of the switch 3 exhibits a control hollow 33 corresponding to the grip recess 32 of the flap 9, which rests against the inside of the grip recess 32. In the further the flexible flap 9 covers a symbol 8, which is occupied for tactile recognition easily raised and for better optical recognition with a color above each actuator 29 (only in Fig. 6 represented). For the training of the symbol 8 the flap 9 is twice painted and the last film of varnish by means of a laser procedure is removed in such a manner that the first film of varnish remains and the symbol 8 in this color is illustrated outline-exactly. Of course it is to be manufactured also possible the symbol 8 and the flap 9 in a two-component injection moulding method using two different materials.

A socket 15 is assigned to the casing 12 of the switch 3, from which not represented connection contacts lead to aircraft electrics of the vehicle. The socket 15 sits with its abutments 36 in the side walls 14 of the casing 12 and is fixed by means of screws at the casing 12. Into approximately parallel to the flap 9 running printed circuit board 37 rises up into the casing 12. The printed circuit board 37 carries a micro switch 38, whose pressure tappet 39 points toward the control side 30 of the actuator 29 in each switching zone 23. On the inside of the actuator 29 without control hollow 33 a tappet 40 is angeformt, which cooperates with the pressure tappet 39 of the micro switch 38. The actuator 29 with the control hollow 33 affects directly the pressure tappet 39 of the micro switch 38.

In the further is the printed circuit board 37 and/or. the micro switch 38 a source of light 41 trained as light emitting diode assigned, whereby the zone bar 24 of the casing 12 with a freeing 42 for the source of light 41 is provided. The circulating tractor margins 43 of the actuator 29 laid out as light guides a shining staff 44 goes off, that ends within the range of the source of light 41. In the finallateral range of the shining staff 44 are light photograph surfaces 45, which permit a larger cover of the shining staff 44 with the source of light 41 to 29 in the actuated switching position of the actuator. Thus in this position more light it is taken up and led to the control side 30 according to which the switching position is recognizable.

The micro switch 38 is subjected to the assigned actuator 29, whereby an excess stroke of the actuator 29 and the associated overloading of the micro switch 38 by abutments 46 of the socket 15, those with latches 47 and/or. their lax ends of 48 of the actuator 29 cooperate, are prevented. During the admission of the actuator 29 the lax end of 48 at the abutment 46 comes to the plant and limits the lift of the actuator 29 downward. The lift is limited upward by lax tap 49. With the left embodiment in accordance with Fig. 6 the lax tap 49 angeformt at the casing 12 is and works with a slotted hole 50 of the latch 47 of the actuator 29 together (see also Fig. 4).

In the right embodiment in accordance with Fig. 6 the lax tap 49 is angeformt to the lax 47. Into the casing 12 a groove 51 is trained, whereby the lift of the actuator 29 is limited by the plant of the lax tap 49 at a groove notice 52 of the groove 51 (see also Fig. 3) In both remarks 29 two opposite lax 47 is intended for each actuator.

In the Fig. the left actuator 29 is subjected 7. The tappet 40 affects the spring-loaded pressure tappet 39 of the micro switch 38 and pushes these the inside the micro switch 38. A switching contact of the micro switch 38 thereupon actuated and its signal passed on over the connecting cables. Simultaneous one is pushed the shining staff 44 with the light photograph surface 45 toward for the source of light 41. Thereby results a larger cover, which causes a larger light entrance into the actuator 29. After releasing the actuator 29 the pressure tappet 39 under the effect of a switch feather/spring of the micro switch 38 shifts the actuator 29 upward, until the lax taps 49 of the casing 12 at the end of the slotted hole 50 of the actuator 29 come to the plant.

In the execution after Fig. the flap of 9 two closed-up switches 3, which form the pair of switches 5, spans 2. The Fig. 1 shows a functional unit 7, which is taken off by an accordingly formed flap 9. After a not represented embodiment the flap 9 spans the entire percussion pot 4 including the switches 3 and the functional unit 7. Of course the flap exhibits 9 appropriate being for a Airbag in this case.



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1. Switch (3) and/or display element (6), that and/or. into a steering wheel (1) of a motor vehicle, characterised in that the free surface of the switch (3) is built and/or the display element (6) with a flexible flap (9) is covered.
2. switches and/or display element according to claim 1, characterised in that the free cap surface (10) to the surface structure of the steering wheel (1) is adapted to the flap (9) and at its edges (11) a continuous transition to the steering wheel (1) exhibits.
3. Switches and/or display element according to claim 2, characterised in that the edges (11) of the free cap surface (10) with a transient area between the switch (3) and/or the display element (6) as well as the steering wheel (1) covering, circulating transition lip (18) are provided.
4. Switches and/or display element after one of the claims 1 to 3, characterised in that for the definition of the flap (9) at a casing (12) of the switch (3) and/or the display element (5) Hinterschnitte (13) are attached, in which corresponding Hintergriffe (16) of the flap (9) intervenes.
5. Switches and/or display element according to claim 4, characterised in that the Hinterschnitte (13) into side walls (14) of the casing (12) are let in, and the flap (9) with one flexible edge putting on (11) is provided to the side walls (14), to which the Hintergriffe (16) is angeformt.
6. Switches and/or display element according to claim 5, characterised in that the side walls (14) of the casing (12) in the coverage with the edge (11) of the flap (9) around the thickness of the edge (11) are tapered.
7. Switch and/or display element after one of the claims 4 to 6, characterised in that the casing (12) with upper edges (25), exhibiting at the insides (26) radii (27), at least are provided.
8. Switch and/or display element after one of the claims 1 to 7, characterised in that at least the inside of the flexible flap (9) in the range of an actuator (29) of the switch (3) its outline are copied.
9. Switch and/or display element after one of the claims 1 to 8, characterised in that the flap (9) on their lower surface with the actuator (29) of the switch (3) circulating depression (31) are provided.
10. Switch and/or display element after one claims 1 to 9, characterised in that casing (12) switch (3) into at least two with actuators (29) provided switching zones (23) divided is, which by bar radii (, at which the flap (9) lies close, are separate 28) exhibiting zone bars (24).
11. Switch and/or display element according to claim 10, characterised in that the outline of the actuators (29) a tangential transition to the top side of the zone bar (24) exhibit.
12. Switch and/or display element after one of the claims 1 to 11, characterised in that the flap (9) made of a transparent material and the actuator (29) as light guide, which with a source of light (41) of the switch (3) cooperates, are trained.
13. Switch and/or display element after one of the claims 1 to 12, characterised in that the cap (9) within the range and/or. the actuators (29) of the switch (3) and/or the display element (5) optically and/or covers tactile detectable symbols (8).
14. Switches and/or display element according to claim 13, characterised in that the symbol (8) and the flap (9) of at least two different materials consist.
15. Switch and/or display element after one of the claims 8 to 14, characterised in that the actuator (29) of the switch (3) a housing-solid micro switch (38) subject.
16. Switch and/or display element according to claim 15, characterised in that the actuator (29) by at least an abutment (46) in its lift are limited.
17. Switch and/or display element after one of the claims 1 to 16, characterised in that the flap (of 9) at least two closed-up switches (3) and/or display elements (6) span.
18. Switch and/or display element after one of the claims 1 to 16, characterised in that the flap (9) at least two beabstandete to each other switch (3) as well as at least between the switches (3) arranged a display element (6) spans.
19. Switch and/or display element after one of the claims 1 to 18, characterised in that the outer contour of the casing (12) of the switch (3) and/or the display element (6) of the form of the percussion pot (4) and/or the spokes (2) of the steering wheel (1) are adapted.

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